METHOD OF APPLYING A CEMENT MIXTURE TO A HONEYCOMB BODY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 61/130,519, filed May 30, 2008, the entire disclosure of which is hereby incorporated herein by reference.

FIELD

The present disclosure relates generally to applicators and methods configured to apply a cement mixture, and more particularly, to applicators and methods configured to apply a cement mixture to an exposed matrix of intersecting walls of a honeycomb body.

BACKGROUND

Conventional methods and apparatus are known to apply a cement mixture to an exposed matrix of intersecting walls of a honeycomb body. FIG. **1** schematically illustrates the interior area **901** of a quarter section of a conventional applicator (not shown) in which a cement mixture flows into the applicator along a pathway **903** from an inlet port **904** to an elongated outlet port **940**. The inlet port **904** is typically located near the center of a middle section of the applicator. As a result, a non-uniform delivery of the cement mixture typically results where more cement mixture tends to accumulate in the middle section than the side sections of the applicator. The non-uniform delivery can be represented by line portion **905** indicating a relatively high cement mixture deposit rate at the middle section and line portion **907** and a relatively low cement mixture deposit rate at the side sections of the applicator **901**. The non-uniform delivery can also be represented by the velocity profile **909** extending from the middle section to one side section.

FIG. **1**A provides a graph illustrating example velocity profiles **909***a*, **909***b* of the cement exiting the outlet portion of the conventional applicator. The velocity profile **909***a* represents a cement flow rate of 15.57 cm^3/second (0.95 $inch^3$/second) while velocity profile **909***b* represents a cement flow rate of 20.48 cm^3/second (1.25 $inch^3$/second). The Y-axis represents the velocity, in inches/second, of the cement mixture exiting the elongated outlet port **940**. The X-axis represents the distance, in inches, from the center of the middle section to the outer end of one side section. As shown, the total distance between the center of the middle section and the outer end of the illustrated side section is 25.4 cm (10 inches). As FIG. **1** represents a quarter section, it will be appreciated that the overall length "L" of the gap at the illustrated example nozzle exit is 50.8 cm (20 inches) from the outer end of the illustrated side section to the outer end of the other side section (not shown). It will therefore be appreciated that the velocity profiles from the center of the middle section to the outer end of the other side section can be represented by a mirror image of the graph illustrated in FIG. **1**A.

Each velocity profile **909***a*, **909***b* demonstrates the non-uniform delivery of the cement mixture along the length of the applicator. The non-uniform delivery can require an increased cement mixture flow rate through the inlet port **904** to provide adequate cement mixture delivery at the side sections. Otherwise, undesirable application characteristics may result at the side sections of the applicator. However, increasing the cement mixture flow rate to address deficiencies at the side sections may provide excessive cement mixture delivery at the middle section of the applicator. Such excessive cement mixture delivery may result in undue waste of material. In further examples, the conventional nozzle associated with the applicator may result, for example, in undue waste of material and/or other undesirable application characteristics.

SUMMARY

In accordance with one aspect, a method is disclosed herein for applying a cement mixture to an exposed matrix of intersecting walls of a honeycomb body. The method is conducted with an applicator including a flow distribution device with an inlet port and an elongated outlet port extending along an elongated axis. The method comprises the steps of feeding the cement mixture into the inlet port of the flow distribution device, forcing the cement mixture to exit the elongated outlet port with a substantially uniform velocity profile along the elongated axis, and depositing the cement mixture on the exposed matrix of the honeycomb body.

In accordance with another aspect, an applicator is disclosed herein that is configured to apply a cement mixture to an exposed matrix of intersecting walls of a honeycomb body. The applicator includes a flow distribution device with interior contours at least partially defining an interior area between an inlet port and an elongated outlet port. The interior contours are configured to decrease a resistance to a flow of a cement mixture in a lateral direction from the inlet port along a path located upstream from the elongated outlet port.

In accordance with another aspect of the present invention, an applicator is provided that is configured to apply a cement mixture to an exposed matrix of intersecting walls of a honeycomb body. The applicator includes a flow distribution device with an inlet port and an elongated outlet port extending along an elongated axis. The flow distribution device is configured to distribute a cement mixture between the inlet port and the elongated outlet port to exit the elongated outlet port with a substantially uniform velocity profile along the elongated axis. The applicator also includes a nozzle with an end surface elongated along a length of the nozzle. The end surface includes an elongated outlet port extending along the length of the nozzle and in fluid communication with the elongated outlet port of the flow distribution device. In some embodiments, the end surface includes a transverse width from about 2.54 mm (0.1 inches) to about 5.08 cm (2 inches) along the length of the nozzle.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other aspects of the present invention will become apparent to those skilled in the art to which the present invention relates upon reading the following description with reference to the accompanying drawings, in which:

FIG. **1** is a schematic perspective view of a quarter section of an interior area of a conventional applicator;

FIG. **1**A graphically illustrates the interior area outflow velocity profiles using the conventional applicator of FIG. **1**;

FIG. **2** is an exploded, top perspective view of an applicator according to an example embodiment as disclosed herein;

FIG. **2**A is a sectional view of the applicator along line **2**A-**2**A of FIG. **2**;

FIG. **3** is a schematic perspective view of an interior area of a quarter section of the example applicator of FIG. **2**;

FIG. **4** graphically illustrates a comparison of outflow velocity profiles of the example applicator of FIG. **2** to the outflow velocity profiles of the conventional applicator of FIG. **1**;